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March 4, 1998

Mr. R. Dennis Delzeit
Director/City Engineer
Department of Public Services
City of Pismo Beach
760 Mattie Road
Pismo Beach, CA 93409

RE: SEA BLUFF HAZARDS, PISMO BEACH, SAN LUIS OBISPO COUNTY, CALIFORNIA

Dear Mr. Delzeit:

This letter was prepared in response to a request made on February 12, 1998,by Anne Tanouye from the State Office of Emergency Services (OES) - Southern Region for geological assistance from the Department of Conservation, Division of Mines and Geology (DOC/DMG) for the City of Pismo Beach, as requested by the San Luis Obispo County OES, in evaluating the sea bluff failures affecting roads, utilities, and residences. The State OES Mission Number for this investigation is No. 98-SOU6106.

INVESTIGATION

On February 18, 1998, I investigated five sites of coastal bluff failures along the City's roads (see attached Map). Potential threat to streets, pedestrians, and residences and feasibility of mitigation were discussed with Dennis Delzeit, City Engineer/Director of Public Services and Larry Versaw, Public Services Engineer. Technical advice and information concerning alternative mitigation and engineering measures in dealing with unstable slope and sea wave erosion problems were also offered.

GEOLOGY AND SEA BLUFF HAZARDS

The areas of concern are located along the coastal bluff which is underlain by the slide-prone Monterey Formation (Middle Miocene siltstone), Obispo Formation (Lower Miocene tuff) and terrace deposits (unconsolidated Pleistocene sediments), as described by C.A. Hall (1973). Sea bluff failure and erosion, or the resulting shoreline

retreat, is a continuous on-going process except where mitigation measures are implemented to reduce sea wave erosion, slope failure of the bluff, and surface water erosion of the bluff face.

Another important source of hazard is the water saturation of the sea cliff due to ground water seepage at the base of the terrace deposits overlying the Miocene sedimentary rocks at the face of the bluff. The high water content of the terrace deposits and underlying rocks severely weakens the earth material and consequently increases the slope failure susceptibility of the bluff. In addition to rainfall, urban irrigation is a major contributing factor to the excess groundwater seepage at the bluff.

All five areas of concern are subject to slope failures and sea wave erosion. The road at site no. 1 has been closed to traffic. Site no. 4 and 5 have significant problems of surface water erosion as street and swale drainages are directed to flow over the sea bluff. Pedestrian traffic along the top of the bluff seems to be a public safety issue at all sites; in particular at the entrance to the Margo Dodd Park (site no. 2) where bicycle parking is located on top of an active landslide. This slide has been undermined by sea wave erosion and slope failures at the toe; it is highly unstable and subject to collapse, particularly during and after heavy rainstorms.

CONCLUSIONS

1. Without effective mitigation measures, further deterioration (slope failures and erosion) of the sea bluff will increase the risk of emergency conditions concerning the safety of the roads, residences, and pedestrian traffic at the top of the bluff. The present rainy season has accelerated the deterioration and the forecast increase of rainstorm intensity for the next 2 months will certainly worsen the situation. Restriction of pedestrian traffic seems to be an important public safety issue as slope failures affecting the upper edge of the sea cliff are expected to be more frequent during rain storms.

2. Hazard mitigation of coastal bluff generally includes the reduction of three types of natural processes, namely: (a) sea wave erosion of the cliff, (b) slope failure of the bluff, and (c) erosion of the cliff face. Each type of hazard requires different kinds of mitigation and engineering measures. Effective mitigation should include reduction of all three types of hazardous processes as each type of process adversely affects the bluff independently from the others. Combination of these hazardous processes will accelerate the damage to the bluff.

3. Feasible mitigation measures discussed for the three types of hazards include: (a) for sea wave erosion - installation of a sea wall (preferably with a naturally compatible appearance), rip rap or grouting of the toe area of the bluff; (b) for slope failure - installation of dewatering devices (i.e. lateral subdrainages, water wells),

reduction of urban irrigation; grouting of the bluff, placement of shear pins, and installation of retaining structures (walls) with tie-back anchor system, etc; and (c) for surface erosion - preventing and/or confining drainage at the surface of the bluff face (i.e. in pipes, concrete ditches, street drainage, storm drains, drainage berms). The problem of funding for the implementation of mitigation measures is not yet resolved.

Main reference:

Hall, C.A., 1973, Geology of the Arroyo Granda quadrangle, California: California Division of Mines and Geology Map Sheet 24, scale 1:48,000.

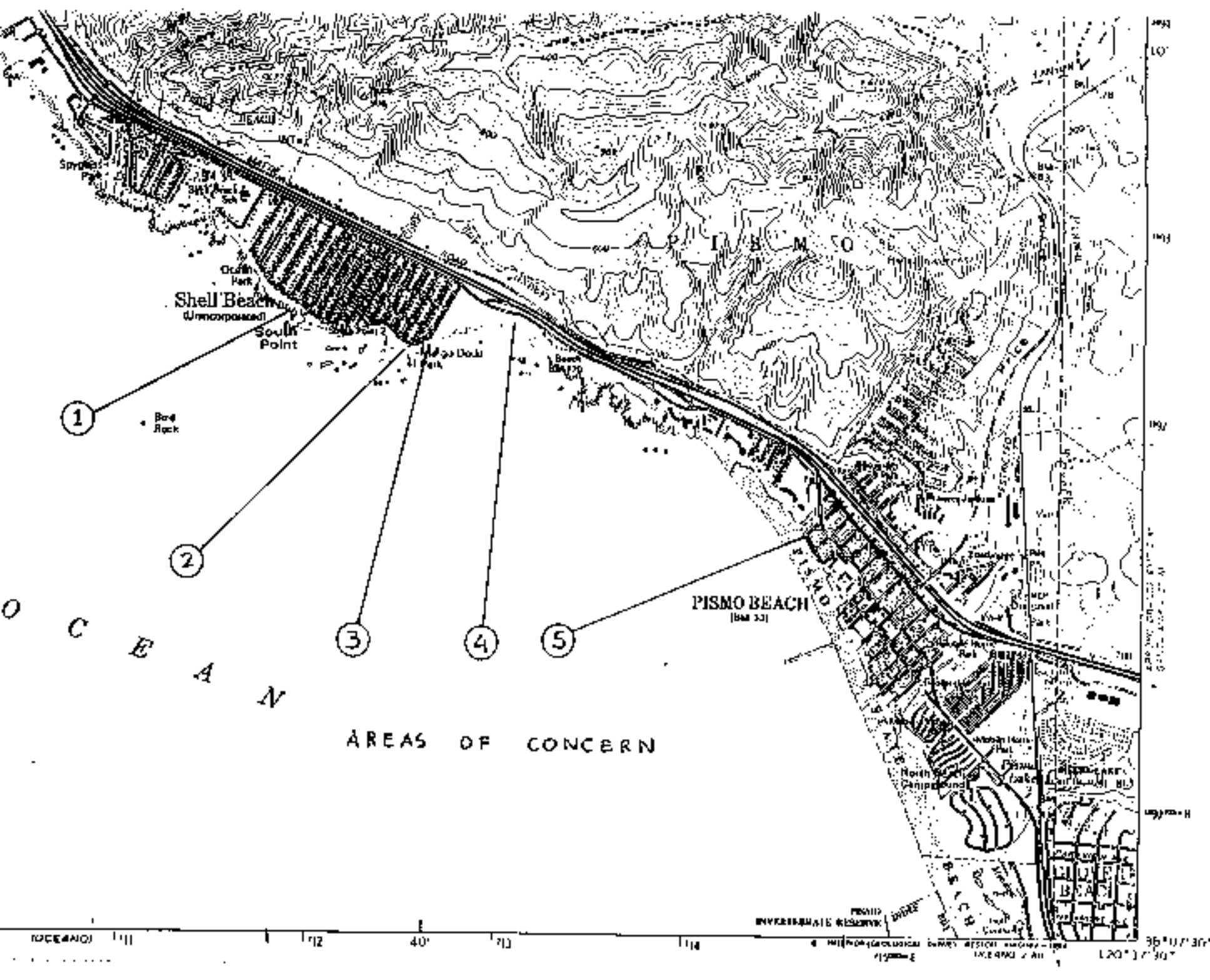
Siang S. Tan, CEG 975
Associate Engineering Geologist

Concur

Date Trinda L. Bedrossian, CEG 1064
Supervising Geologist

Attachment: Location map

cc: Larry Versaw
Ann Tanouye
James Davis


Shell Beach
(Unincorporated)
South Point
Bird Rock
PISMO BEACH
1
2
3
4
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OCEAN
AREAS OF CONCERN